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Proceedings of the Annual Meeting
Held January 15, 1934

OFFICE OF THE SECRETARY
75 WEST STREET
NEW YORK

AMERICAN INSTITUTE
OF
CONSULTING ENGINEERS
INC.

Proceedings of the Annual Meeting
held at the University Club,
New York City, January 15, 1934

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ANNUAL MEETING
of the
American Institute of Consulting Engineers, Inc.

The Annual Meeting of the American Institute of Consulting Engineers, Inc., preceded by a dinner at 7.30 o'clock, convened at 9.15 p. m., Monday, January 15, 1934, at the University Club, 1 West 54th Street, New York City. Dr. C. P. Perin, President of the Institute, presiding.

The following members were present:

O. H. Ammann
George E. Beggs
E. B. Black
Clinton L. Bogert
Henry R. Buck
George W. Burpee
John N. Chester
J. F. Coleman
W. H. Coverdale
F. G. Cunningham
Chandler Davis
Harrison P. Eddy
James Forgie
George W. Fuller
Gavin Hadden
Alonzo J. Hammond
Shortridge Hardesty
Philip W. Henry
L. Alfred Jenny
W. S. Kinnear
Fred Lavis
Charles T. Main
Daniel W. Mead
Ralph Modjeski
F. A. Molitor
E. K. Morse
George A. Orrok
C. P. Perin
Henry G. Perring
Malcolm Pirnie
William B. Poland
Ralph R. Rumery
Maurice R. Scharff
F. W. Scheidenhelm
Ole Singstad
Carl H. Stengel
Lewis B. Stillwell
J. A. L. Waddell
Edwin F. Wendt
Robert Spurr Weston

There were also the following guests present:

Warren Armitage
W. P. Beazell
Gordon K. Bell, Jr.
Willis H. Booth
Harry Casler
J. H. Critchett
John W. Doty
Paul Doty
Lester D. Gardner
Wesley W. Horner
Jerome C. Hunsaker
Arnold Knapp
Fred Lavis, Jr.
William L. Laurence
Clark H. Minor
A. B. Parsons
Calvin W. Rice
Robert Ridgway
John E. Slater
F. E. Schmitt
Montgomery Waddell
Louis Wiley

President Perin: One of our very distinguished members of the American Institute of Consulting Engineers is Dr. Waddell, who to-day celebrates his eightieth birthday. (Applause.) I propose a toast to him.

(The members of the Institute arose and drank a toast to Dr. Waddell.)

Mr. O. Singstad: As one fisherman to another, I am going to ask, Dr. Waddell, that you make a speech. If you have nothing else to tell them, tell them a fish story.

Dr. J. A. L. Waddell: I might tell you about the last fishing trip that three of us engineers made to Miami and Bimini. We went down to Miami by steamer about the middle of April, and immediately started due east for Bimini, an island about 60 miles distant at the eastern edge of the Gulf Stream, in our little 35-ft. boat, and stayed there for nine days. The three of us during that period landed over 5,000 pounds of fish. (Laughter.) Then, we returned to Miami, and one of the three went home. The other two stayed there and fished for sixteen days, catching some 4,100 pounds of game fish, including many large sailfish and a 94-lb. marlin. (Laughter.) That is a true fish story, the records being kept on engineering principles.

I might tell you that one day, south of Bimini, we took fully 1,000 pounds of fish, but the reason for that was that I caught a 350-lb. shark. When I saw it was a shark—Walter Irving was with me—I said to him, "Walter, I have caught lots of big sharks in my time and I don't care to catch any more, whilst you have never taken any"; consequently, I passed the rod over to him, and in fifteen or twenty minutes he had the brute up to the boat. It was a 9-footer.

I must tell you a joke on Walter Irving. He is an old-time fresh water fisherman; but he had done only a little fishing in salt water, and that on a small scale. The second day out, when we were in the Gulf Stream, he yelled out, "Stop her! I am hung up on the bottom," but there was no bottom for two or three hundred feet. He had hung a very large fish, but it escaped.

The third day, at half past eight in the morning, Irving hooked a 200-lb. marlin swordfish—the first strike of the day. He fought it until 12 o'clock before he got it fairly close to the boat, when the hook pulled out. After the fight was over, we found ourselves ten miles out at sea; and we lost an hour going back to the good fishing ground.

We certainly got some very fine fishing down there, landing twenty-five varieties of fish, including one 85-lb. marlin. I got a 70-lb. amberjack; and the others caught two 50-pounders. I didn't catch any marlin; but I hooked one and lost it. I have hooked only two marlin in all my fishing experience. The next time I shall catch one, as now I have learned how to do it.

Possibly I shall be able to tell you a new fish story next year.

Mr. O. Singstad: May I now ask you if you and your distinguished party here are convinced that it may be possible to be an eminent engineer and a renowned fisherman?

President Perin: I hope when another of us reaches the age of eighty, we will be able to catch ten thousand pounds of fish.

I am going to ask our distinguished guests to bear with us while we carry out the customs of the Institute in going through a certain amount of general routine. We won't ask you to listen to the minutes of the last Annual Meeting. We would like to hear from the Tellers in regard to the results of the vote.

Mr. Lavis: Mr. President and Gentlemen: I beg to report that the total number of ballots cast was sixty-five, two of which were imperfect. There were therefore sixty-three ballots cast for Messrs. Cunningham, Hadden and Scharff.

President Perin: As a plurality only is necessary for election, I hereby declare that Messrs. Cunningham, Hadden and Scharff are elected members of the Council for the term ending January, 1937.

The second vote is upon the amendment to the Constitution. Will you give us the results of that?

Mr. Lavis: There was a total of sixty-nine ballots cast on the amendment to the Constitution, one of which was imperfect. So, there were sixty-eight ballots cast in favor of amending the Constitution by omitting the words "Senior Grade," which are the last two words of Section 2, Article III.

PRESIDENT PERIN: The Constitution is therefore amended as stated in the ballot.

The next thing in order is the report of your President on what you have been doing the past year.

Our membership on January 1, 1933, was 110. During the year two men were elected and we lost by death and resignation 8, leaving our present number at 104. The new members to be added to our roster are Mr. Montgomery B. Case and Mr. James Forgie. The deaths which we regretfully record are those of T. Chalkley Hatton of Milwaukee, J. R. McClintock and J. Waldo Smith of New York, and Dr. Wm. Lispenard Robb of Troy.

During the year we have held ten monthly meetings, at which we had an average attendance of 17 members and 8 guests. Among our speakers were Mr. Louis Wiley of the *New York Times;* Mr. E. P. Thomas, President, National Foreign Trade Council; Mr. E. Stanley Glines, President, American Founders Company; Mr. Francis H. Sisson, Vice-President, Guaranty Trust Company; Mr. Clark H. Minor, President, International General Electric Company; Mr. Albert L. Scott, President of Lockwood-Greene Engineers, Inc., and Colonel Hugh L. Cooper.

Through the courtesy of Captain Richard Drace White, U.S.N., the Institute, on May 22, was able to offer to Viscount Ishii and his staff of eleven Japanese (delegates to the Economic Conference in London), together with Consul General Horinouchi, a boat trip up the Hudson River to look at that monument to American engineering and, incidentally, to Mr. O. H. Ammann—the George Washington Bridge. While en route, Mr. Forgie added much to the pleasure of our guests, and their understanding of the great difficulties overcome in building the various tunnels under the Hudson River. Mr. Stearns told of the extremely interesting progress made in the design of the George Washington Bridge. The ventilating system, which determines the possibility of a vehicular tunnel with modern internal combustion engines, was made clear to Viscount Ishii and his party by Mr. Singstad.

At our last meeting Captain Richard Drace White, U.S.N., spoke on the method of cleansing New York Harbor, the dumping of waste at sea, and of the necessity for numerous incinerators as a result of the judgment secured by the State of New Jersey against the City of New York.

The subjects covered during the year ranged from "The Newspaper and the Engineer," by Mr. Wiley; "The Importance of Foreign Trade to Our Domestic Economy and to the American Holder of Foreign Securities," by Messrs. Glines and Thomas; to "The Causes Which Lead to the Present Depression and Steps Necessary to Better the Situation," by both Mr. Minor and Mr. Sisson. An address by Mr. Albert L. Scott on "Some Aspects of the World Trade in Cotton and Cotton Goods," and supplemental remarks by Mr. Allen and Mr. Wood, of Lockwood-Greene Engineers, Inc., were of interest to our members. Colonel Cooper gave an interesting account of his Russian experiences and commented on engineering, social and political questions. Mr. Alexander Henderson, of the firm of Cravath, DeGersdorff, Swaine & Wood, spoke of problems which the Securities Act presents to the Consulting Engineer. Mr. Donald G. Swatland also spoke on the same subject.

Many things have happened since our last dinner which are of vast importance to the industrial world. *Technocracy* has disappeared from the arena, and although this hysteria has passed off, the underlying doctrine survives in the mind of President Green of the American Federation of Labor; and there are times when it seems that General Johnson has not entirely shaken off the shackles of such an economic fallacy.

The opposite point of view seems to be gaining ground, and there are many who feel that the industrial depression can be materially lessened only if the capital goods industries are permitted to go forward. Recognition is dawning that it is impossible to re-employ all of the unemployed merely by spending more in retail stores. And the notion that the nation's capital equipment industry needs no stimulation is an illusion which always appears in every depression. However, once the depression is over, it seems to be preposterous. In this conflict of opinion, the President has given encouragement first to one school and then the other. But in the budget message he bases his financial program for the remainder of his administration on the principle that beginning not later than this coming July, private financing and private investment must rapidly replace R.F.C. financing and public works.

The success of the administration seems to depend largely upon its ability to stimulate private enterprise and private investment; otherwise, when the Government financing and lavish expenditures taper off or stop entirely next year, a more serious slump, which would take the form of disaster, might be reasonably anticipated.

It would seem that agricultural interests have received more than their fair share of the public money, and that the capital goods industry should be aided, so that once more it can take its place in national economy, and much thought is now being given to dispel the psychosis that we have overbuilt and have no further need for capital expenditures.

I am indebted to Mr. William Preston Beazell for several thoughts which may be of interest to our members.

Prof. Dugald C. Jackson, at a recent meeting of the American Association for the Advancement of Science, said "Engineering is an inextricable thread in the fabric of the civilized world's social organization." It seems that this statement is true and that it can be demonstrated that the engineer is one of the most, if not the most, important individuals in the whole program of recovery. The general scheme which our Government has been following began with what was termed: "Agricultural Adjustment." Although it has not always been seen as clearly as it should be, the engineer holds an important place in the modern conception of this basic industry. One of our members, Mr. Thomas Campbell, who is the largest farmer in our country and who was invited to advise the Russians in regard to their farming operations of some 500,000 acres, feels that such problems are wholly engineering. It is interesting to note that the aeroplane is now an important factor in Russian farming as the distances have grown so great that it is impossible to cover these vast areas by the ordinary method of transportation in the time necessary, and observation from a plane enables them to determine the condition of the crops very much better than when on the ground.

In the next general movement of industrial adjustment the place of the engineer is clearly defined, although the leadership here has been rather given over to the labor union organizer.

In the third step—the realm of public works—the engineer is of paramount importance. If proper recognition had been given to this fact and if plans had been related to sound preparation, as they should have been, this part of our program would not have dragged as it has, and the consequent great disappointments would have been obviated.

Our fourth great step was in the matter of money. Here the engineer did not figure except as a paltry but eager recipient.

The fifth step—the civil works program, finds the engineer of more importance than in any of the other divisions. It is true he stands out boldly in the Citizens' Conservation Corps, in the Tennessee Valley Authority, and the New Home and Farm Electrical Authority. With agricultural and industrial adjustment having settled down to routine administration, we find ourselves principally concerned, taking the recovery program as a whole, with the divisions in which the engineer is paramount. When one considers the extent to which the recovery program bears upon the daily lives of everyone of us, and the important part which the engineer is playing, and the greater part he could and will play in the program, it would seem that Prof. Jackson's apothegm becomes all the more striking.

One of the rocks upon which the NRA may split seems to me to be the surrender of control of industry to improperly guided labor unions. That there has been great progress, nobody can question.

For a long time the iron and steel industry has been regarded as the real barometer of trade. An interesting set of figures has just been published by *Steel* which develop these facts: From 1900 to 1929 the average per capita consumption in the United States of steel was 793.2 pounds; in 1932 we dropped to 242 pounds per capita, or less than one-third of our 30-year average. Fortunately, this year we have gone from 242 pounds per capita to 411 pounds, which is an increase of 69.8%; yet, we are only slightly above 50% of the 30-year average. The world's output of steel in round figures for 1933 was 65 million tons, an increase of 31% over the 1932 output of 49 million tons. By way of comparison with the all-time record of 117,980,000 tons in 1929, it would seem that we are now a little above the 50% rate of production throughout the world.

Previously, we have been rather inclined toward economics as the subject for discussion at our annual meeting. However, the situation of the Institute, as well as that of our country, makes appropriate the story of a "nigger" economist in Richmond, Va.:

A rather over-dressed "nigger" applied for employment as a cook at the residence of a lady who had advertised for a cook, and in stating her qualifications she said she was a good cook and wanted $90 per month because her husband had a good job and she didn't have to work, so when she did work, it was for high wages, very high wages. She added that her husband made $40 per week as an electrician. The would-be employer suggested that with so much money in the family they should save a good deal. At this the over-dressed darkey whooped with mirth and said: "No, M'am, we don't waste none of our money savin' it!"

We realize that it is time to abandon such economic principles and we now are turning to the skies for inspiration.

We have as our guest this evening Dr. Jerome C. Hunsaker. We could give him a Naval title and call him by now Admiral, had he not surrendered his uniform for a professorial toga.

Dr. Hunsaker has been honored by a number of institutions, including the Navy. His contribution to aeronautics has been greater than perhaps that of any other man in our country. He was among the earliest men in the Navy to realize the possibilities of the aeroplane as an "implement of warfare," and he is going to talk to us on this subject this evening.

When I was a freshman at Harvard, we had two great mathematicians, one of which was Professor Benjamin Pierce. He was going to lecture one evening before the Lowell Institute. He asked the indulgence of the Institute for a little bit until his son, James Mills Pierce, should come, because, he said, "I am perfectly sure that nobody else in this audience will understand what I am going to talk about."

In order to make Professor Hunsaker feel a little more at home, I asked Mr. Lester Gardner to come this evening. He is familiar with the terms of aeronautics and perhaps can explain anything we don't understand. Dr. Hunsaker! (Applause.)

Dr. J. C. Hunsaker: Mr. President and Gentlemen: I don't believe I am expected to thank the President for his embarrassing introduction, but I do thank the Institute of Consulting Engineers for the invitation to come here and talk to you, because I wanted to discuss a problem that is enormously important to me, and I had an expectation that I might get about $63,000 worth of consulting service from the sixty-three members of the Institute here assembled.

I have recently been drafted out of industry to become a school-teacher. As such, I have been made responsible for the education of a large number of young engineers of the coming generation. The preparation of these young engineers is a responsibility that is somewhat appalling, because it is quite evident that my experience is no guide at all to the experience that these young men are going to have in the next ten or fifteen years. For example, we cannot explain to these young men that the end of an engineer is to increase production and displace labor, and for these services to be rewarded by a grateful society. The engineer must do a little more than that. We already begin to suspect the economic white elephant in some splendid engineering achievements, like world-record skyscrapers, mammoth hotels, super steamships, gigantic locomotives, and Pullman cars of tremendous weight.

It seems that the engineer must accept some responsibility for the social and economic consequences of the things he creates, and in order to accept this responsibility he is required to forecast, at least to some degree, what the consequences will be of the things that he is going to do. We know that the commercial mind can make a very shrewd guess as to the short-term commercial results of some proposed operation, and the engineer, especially if he be guided by an eminent consulting engineer, a member of this Institute, can predict with accuracy the operational characteristics of the new project. But the economist has proved to be a very uncertain guide for the social and economic consequences that may result from it. So, the engineer is left only with an intuitional judgment in this very important matter.

We were taught as young men that the world would beat a path to the door of whoever invented a superior mouse-trap; and now we wonder if that world is willing to finance an International Mousetrap Company on the Kruger model, with perhaps subsidiaries in every country, to breed mice for release in order to keep up the sale of mouse-traps; and will they employ a competent engineer to provide new models every year that will be streamlined, or perhaps hair-lined, or something else, to insure that there shall be rapid obsolescence.

We have had an absurd reversal of policy in our recent history. Beginning with every effort to increase production and facilities and to displacing labor, we now have an almost complete embargo on capital goods and production facilities, with reduction in hours of employment. We have the construction of useless works, so-called public works, which will not involve maintenance costs or produce anything. (Applause.) It is almost as bad as these mouse-trap factories and mouse-breeding establishments.

There must be somewhere some principle of balance and harmony to be discovered that should guide the engineer. Whether we discover these principles of balance and harmony or not, we do know that technological change is going on anyway. Technological change is inherent in applied science, and the engineering that we practice, and the engineering that our successors, the young engineers, will practice, will deal almost entirely with technological change, either creating that change or adapting themselves and existing industries to it.

We have going on now what I believe to be a most profound technological change, for which we have not yet made the necessary adaptations. I refer to the new knowledge which has come out of the application of science in the fields of aerodynamics and metallurgy and petroleum technology as applied by the automotive engineer to highway vehicles, and by the aeronautical engineer to aircraft.

These two types of vehicle are results of the internal combustion engine. Both the highway vehicle and aircraft have already forced a place for themselves in our general transportation pattern, and the railroads have already felt the effect, beginning with their branch-line traffic, and then their short-haul traffic, and their less than carload traffic; and now, airplanes are taking some of the long-haul passenger traffic from them.

The steam and electric railroad does, however, seem to have a secure place in the transportation picture, and the steamship in the water transportation picture. But if we examine this apparent security through the eyes of the young engineer of 1934, such as I have come in contact with in the last few months, it is interesting to see how he looks at it. He sees that the horse is gone. That doesn't surprise him, because it always has been gone in his life. The interurban railway is a curiosity. There are a few street-cars left, but he never rides in one. When he takes a short journey, he and some of his buddies go in an old Ford car, or he is quite prepared to go by bus. If he has allowance enough from home, he will go home by airplane. If he hasn't enough money, he finds he can be carried at an absurdly low figure on the main line railways.

In his school work, he comes around with the most amazing and ingenious excuses to avoid steam boilers, reciprocating machinery, turbine design, general power plant design, and crowds into his options, diesel engines and internal combustion engines.

Most of these students were advised this Christmas vacation to start looking for a job. They came back and reported that the railroads didn't want any junior engineers; that there were no opportunities in the coal business; that there were some jobs to be had in the oil business, in the automotive industry, and with air transport companies.

These young students, in their reading, have learned that the railroads do not make a profit, and they learn in their technical courses that a locomotive with fourteen Pullman cars weighs about three million pounds, and that the rail joint shocks on the unsprung weight are on the order of twenty or thirty times gravity; and furthermore, that the modern alloy steels, and the light alloys of aluminum and rubber are not the basis of design of railway equipment. He also learns that airplanes carry passengers across the continent in one day. He reads that large steamships only exist by national subsidy; that to increase the speed of a steamship from twenty-three knots to thirty knots would double the cost; that a super-Leviathan to compete with the new Cunarder that is being built might cost thirty millions of dollars. He also learns that the Graf Zeppelin has crossed the Atlantic fifty times. You can appreciate his doubts as to what he is going to do, and how he is going to apply the things he has been studying. The existing transportation systems seem to violate his idea, a recently-acquired idea, of an engineering solution by the application of science as of 1934. He has no appreciation of and no sympathy with historical origins or standardization or capital investment or the load of debt that the present transportation structure has to carry.

This seems to be the problem that we have; how to fit young engineers to practice your profession in this coming generation. That is the problem I would like to consult with all of you about.

Beginning with steamships, it appears that the airplane to-day does not offer an adequate pay-load for long overseas flights, where there is no opportunity for the airplane to stop to refuel. For long flights, in the present state of the art, such as transatlantic flights, the pay-load is zero, because all of the load capacity is needed to carry the necessary gasoline to get there. On the other hand, the airship, such as the Graf Zeppelin and her successor, which is now being built, does offer a substantial pay-load and promises to be a relatively cheap means of cutting the crossing time of the Atlantic to about one-half. There is an opportunity to relieve the steamship owner from the pressure for uneconomical speeds by arranging for those passengers who are willing to pay an extra price to go fast, say five or six per cent. of the passengers, to go by air and pay extra for it.

As to the railroads, the situation is not quite the same, because the airplane is already taking a substantial part of the long-distance traffic. They are doing this with only a slightly increased fare, and with not unduly diminished comfort and safety. The comfort and safety are not quite perfect, but evidently the air lines have achieved a commercial degree of safety.

Automobiles and buses and trucks, as I said before, seem to have taken the branch-line business. I have talked with many railroad men, and while it is possible to reduce the losses on the branch-lines, nothing that anyone can think of will make a branch-line profitable.

The private automobile has taken a great amount of the short-distance passenger business from the main lines. Of course, we are all familiar with what the motor truck has done to less than carload lot freight.

But there seems to be something unnatural with the picture on account of Government regulation of the railroads and public building of highways. These highways, while now carrying a great volume of traffic, cannot support higher speeds. If the volume of traffic grows on the highways, the average speed must come down. So, the disease seems to be somewhat self-limiting. At the Automobile Show, we see eighty-mile-an-hour automobiles. I don't know where we are going to drive at eighty miles an hour for a full hour. If too many of us try it, none of us will drive any more.

But the demand for speed from the public which cannot take to the air for its long journeys, seems to indicate that the railroads can and should do something about that, using their own rights of way, which represent a substantial part of their capital.

The aeronautical and the automotive engineers, whose work has created a large part of the trouble for the railroads, are available to the railroads for the reconstruction of their own rolling stock. It appears that with modern automotive type construction, that is, internal combustion engines, alloy steels, light alloys of aluminum, aerodynamic refinements, that speeds of one hundred miles per hour with such automotive type vehicles are quite within the capacity of the existing rails and curves. The center of gravity can be dropped from some seventy-two inches for the present Pullman cars to about thirty-eight or forty inches, doing the same thing to these vehicles that the automobile industry has done to their vehicles when speeds were pushed up.

I have some slides that will give you a better idea of what I am talking about. The whole problem is one of adaptation of the new knowledge in aeronautical and automotive engineering to railway transportation. It may be that only in times of depression do we admit these new ideas that have come knocking at the door for the last eight or nine years.

There has been only one diesel engine train built, and that is running, experimentally, in Germany. It is the so-called Flying Hamburger, and runs between Berlin and Hamburg. It is a ninety-mile-an-hour train. The Pullman Company have one or two such trains under construction. The Budd Company is building one for the C., B. & Q. This is a picture of one that the Goodyear Zeppelin Company, the airship subsidiary, has proposed for another railroad. The structure is designed pretty much like a turtle. The shell of the train itself is the shell of the turtle. The roof and the sides are the girder. The trucks are completely inside the shell to avoid air resistance between car and ground. It will be propelled by an eight hundred horse-power diesel engine, with electric generator and motors on the trucks. The shell is made of a high strength alloy of aluminum, sealed up and air-conditioned. Such a train running on straight tracks seems quite capable of doing one hundred miles an hour, and not less than eighty on most of the curves.

(Slide). This shows a comparison between the pay-load capacity of flying boats suitable for over-ocean work and airships for the same duty, to illustrate the inherent characteristics of the two kinds of craft.

From those curves we conclude that for non-stop flights of the order of a thousand miles or so, the flying boat is well adapted; but for non-stop flights across the Atlantic, the pay-load capacity, so far as we can see it now, vanishes, and they are not adapted to compete with steamships.

The curves at the top of the chart, the large ones, are for contemporary airships, the lower one and the upper one with all improvements now in the laboratory stage. The present airship shows a maximum pay-load capacity for a three or four thousand mile range, indicating that that particular type of aircraft is already adapted for transoceanic service. For airships, for a flight of from three to four thousand miles, the cost per ton mile is something less than forty or fifty cents.

Every type of vehicle has some economic sphere of utility, and it would appear that in any transportation system, we ought to use whatever kind of vehicle best fits the service, and best meets the demand.

(Slide). On the next slide, I have put together some figures regarding all classes of transportation vehicles. Airplane transport, making speeds of 165 miles and above, that have to stop about every five hundred miles to refuel in order to be economical, carry a load of ten or twelve passengers, and will do it for about eight cents per passenger mile, whereas the kind of airplane transport we had last year, with a speed of about 110 miles an hour, was cheaper per passenger mile, about six cents, indicating that the air transport industry has increased the cost per passenger mile within the last year by putting on higher speed ships. They must have good reason to do it. It must be that the public is more willing to ride if more time is saved.

The rigid airship, which has a non-stop distance with economy of four thousand miles, has a passenger mile cost of thirteen cents, which is much higher than the airplane cost, and indicates that the airplane and the airship cannot be competitive on routes that the airplane can serve. If the route is a short route, permitting frequent stops, the airplane can give a much more economical service than the airship, and a much faster service.

Superliners, like the Bremen and the Europa, can run for about ten cents per passenger mile. I can't say that that is the cost, but that is the way the fares work out. The cost may or may not be more than that. It depends on what kind of subsidy they have. The cabin liners have cut that price to six cents. The difference between six cents and ten cents is about a day or a day-and-a-half. Evidently the majority of the traveling public would rather pay six cents and have their pleasant ride last a little longer.

When we come to the railroads, these high speed rail cars, such as are being experimented with, show a cost of about two cents against the *de luxe* trains at five cents. There is the only case we have where increased speed means lower cost.

With reference to motor vehicles, the figures on automobiles are somewhat controversial; one cent a passenger mile for the private automobile, that is, assuming four people ride, and a cent-and-a-half on the bus.

So, the very cheapest transportation is the motor vehicle, but it is also the slowest. It depends also on the highway being available.

COMPARATIVE TRANSPORTATION COSTS

VEHICLE	Average Speed (m.p.h.)	Range without Refueling (Miles)	Full Passenger Load	Cost per Passenger Mile	Cost per Ton Mile*
AIRCRAFT					
High Speed Airplane Transport	165	500	10	8c.	80c.
Low Speed Airplane Transport	110	600	15	6c.	67c.
Rigid Airship (4 Ships)	75	4,000	80	13c.	25c.
BOATS					
De Luxe Liner	30	4,000	400 (1st Class)	10c. (1st Class)	..
Cabin Liner	20	4,000	600	6c.	..
Cargo Steamer	15	4,000	...	..	⅕c.
RAILROADS					
High Speed Rail Cars	80	....	70	2c.	..
De Luxe Trains	50	....	150	5c.	..
Freight Trains	25	....	...	..	1⅕c.
MOTOR VEHICLES					
Automobile	40	....	5	1c.	..
Motor Bus	35	....	25	1½c.	..
Motor Truck	25	....	...	..	5c.

*NOTE.—Passenger airplanes and airships are assumed loaded with freight equal to weight of passengers and their accommodations and mail load.

It looks as if we have this collection of vehicles to work into the pattern of the transportation system, and perhaps they ought to be used in accordance with some non-competitive scheme. The people who are interested in saving money and not concerned with time, certainly might go by motor bus. If the railroads can get their five cents a mile on *de luxe* trains, the railroad is the thing to run. If the railroad, using its same tracks, can carry the people faster on another type of vehicle, automotive vehicle, for two cents, then there is something to think about between the five cents and the two cents. The airplane, which has a fairly high unit cost inherent in its speed, is not adapted to the mass transportation of people; it is not well adapted to carrying people short distances on account of the time it takes to get from the airports to the towns, whereas the railroads own their right of way and bring you into the heart of the cities.

All of these questions having to do with the place of airships versus steamships, and airplanes and railroads and motor vehicles, are things that interest the young men of this coming generation. They see that there are alloy steels, internal combustion engines, and arts which they are now studying that are used in the automotive industry that are not used on the railroads, and they ask the question: Why can't we get jobs on the railroads and work on these problems of modernization?

Perhaps it is not true that the world does not need any more engineers, that there is no place for us. If they will give us a chance, maybe we can make a place for ourselves, not by building more locomotives (there are already too many), but by building something better that will be so economical that the locomotives can be scrapped and still save money.

I have put the question up to the premier consulting body in the world; I hope we might have some views from them. Thank you. (Applause.)

PRESIDENT PERIN: The engineer's principal duty seems to be to annihilate time and space. I was hopeful that Professor Hunsaker would give us some thought as to how this was going to come about.

We anticipated that Dr. Becket would be here this evening and that he would tell us what was being done in the way of new alloys, and the interesting processes that have been developed, of welding aluminum and magnesium compounds. Mr. Critchett has kindly offered to substitute for Dr. Becket, and he is going to tell us in a few words how the electrometrist is going on with these studies. Mr. Critchett is head of the laboratory of the Union Carbide and Carbon Company, and has been making a specialty of the various ferrous alloys as well as those of aluminum, magnesium and the newer minerals. Perhaps Mr. Critchett will tell us what is going on. (Applause.)

MR. J. H. CRITCHETT: Mr. President and Gentlemen: I feel a considerable hesitation in getting up before you here this evening.

It was only at four o'clock this afternoon that I learned, owing to Dr. Becket's illness, he would not be present, and I was asked to take his place. That, of course, left very little time for any preparation. Therefore, anything I may say to you is entirely impromptu, and I can truthfully say, extemporaneous.

I am a bit surprised at being asked to be here to-night, because I am one of those very low individuals who, because of my connections with a large corporation, has to do a considerable amount of consultive work, and the consultation is always free. (Laughter.) However, I will say before you can say it to me, that probably what our customers get is what they pay for.

A very, very interesting subject has been opened for us this evening with regard to transportation, and I speak as a metallurgist, one who is interested in the development of the various alloys and metals that are used in all of the different types of transportation. Metallurgy is playing a part in all of these developments, and we can eventually expect to see some sort of a happy medium come out of the present situation in which the various types of transportation will each be used for the purpose for which it is best fitted.

I recently attended a meeting at which there was considerable discussion about the question of high speed of trains. There are several of them under development now, as you know; one takes practically all of its engineering from the airplane field; another is being built by people who are not familiar—I won't say familiar—who are not specialists in the railroad field; and the third is being built by an engineer who has spent his life in railroad transportation.

I think there are possibilities in all three, and that probably, so far as railroad transportation is concerned, the ultimate will be a compromise of the three. For instance, it was pointed out that of the gain that was expected in a train highly advertised by one of our railroads, a large part, say, seventy-five or eighty per cent. was due to stream-lining, which certainly is a development of the airplane field. Another part of it is due to the use of light alloys of the aluminum base type. Another part of it is due to the development of superior ferrous metals.

After a considerable discussion in that meeting, the consensus of opinion seemed to be that with stream-lining, with cheaper light alloy steels, with the use of the aluminum alloys, the light high-strength alloys where they were best suited, there would probably be a compromise between the three developments that are now under way which would arrive at high speed transportation at very low cost.

That speed of transportation, of course, cannot equal what the airplane can give us; and perhaps the ultimate situation may be illustrated a bit by a trip which I recently made to the Pacific Coast. We went by rail on the way out, because five of us were involved in the trip, and the time taken on the trip was just as useful in the preparation for business as if we had been at home. We used the time on the train effectively for business purposes. We saved money, and had the comfort of a good train.

However, on the Coast, I found myself in the situation where a trip by airplane, a matter of five or six hours in the air, saved me no less than three days of time. Naturally, it did not take any great amount of thought to arrive at a decision as to which way we would travel for that part of the trip; we traveled by air.

That is perhaps an indication of what we may expect for the future.

With regard to the services that metallurgy is playing in this field, I perhaps may be permitted to speak, somewhat humbly, of three phases in which my own connection with the work is playing a part, and where we may expect some advances due to metallurgical development.

A great deal of the air transport, of course, is done in fuselages, in frames that are put together by welding. We have done a great deal of work in the welding field, and are far from reaching our ultimate goal. However, within the last year or so, methods of welding have been developed which are quite capable of successfully putting together much lighter sections than have been used heretofore.

As you well know, the airplane is pretty well standardized on tubular construction, and a great deal of the design, I believe (I am not that type of an engineer), is based on the joints that must be made between the members. There has been some excessive use of metals, heavier sections than are necessary, because of worries in connection with the joints. However, recent developments show that it is perfectly practical to use material of about half the thickness that has heretofore been considered standard; and I think that welding in this way can contribute some to the lightening of the airplane structures.

With regard to motive power, there has been considerable advance, also; one of the limiting features being the high temperatures of the exhaust gases, the difficulty of getting valves and valve-seating materials that will function at the extreme temperatures, and under the extremely corrosive conditions that are now met with in airplane engines, using either the ethyl gases or diesel type of fuels.

Recently, a considerable advance has been made in this field, and through the use of such materials as stellite for the valve seats, and for the seating part of the valve itself, engines are being operated at considerable higher temperatures, and with considerably greater periods between overhauls than has heretofore been practicable. That, of course, is of great aid to the aeronautical engineer.

A third phase in which we can say that metallurgy is playing a considerable part is in connection with the permanent steels. You have heard a great deal about rustless steels of one kind and another. When we speak of those steels in the terms of the engineer, I think we should speak of them as permanent materials rather than as rustless materials.

If it is necessary in designing a structure to allow for the wastage of weathering, we must increase its weight, and we cannot take full advantage of the inherent strength of the materials. However, if we have a permanent material, such as the rustless steels are now proving themselves to be, then we can eliminate this fact of wastage, of rusting, or as some engineers have said, the factor of ignorance, and design very closely to the real strength of our materials.

That will tend to lighten structures both for the airplane and for the railroad, and probably we will see a development from it which will lead to safer, cheaper, and more rapid transportation.

In those three ways the recent developments of metallurgy are playing a part in our transportation problem. In the ultimate, we will find that there is a compromise, there is a utilization of all the materials, all the forms which we are familiar with, and each will play its part, and metallurgy, as well as the other types of engineering, will play their part in the development of our ultimate means of transportation. Thank you. (Applause.)

President Perin: Are there any of our members who would like to ask Dr. Hunsaker or Mr. Critchett any questions?

We asked Major Gardner to come, because we knew it was a subject with which he was thoroughly familiar. Perhaps he would like to make a few remarks.

Major Lester D. Gardner: Mr. President, I do not care to attempt to controvert anything my friend, Dr. Hunsaker, has said, because I know perfectly well that he would squirm out of any argument beautifully and in a way that I couldn't answer.

Your asking me to speak is entirely unexpected. Perhaps I might digress from the subject that is before us and relate a story about Mr. Glenn Curtiss in the early days of aeronautics. You will remember, I am sure, that after the early Wright flights, Mr. Curtiss flew from Albany to New York. In his preparation for this flight, he was looking for possible landing places all the way down the river. He went up to Poughkeepsie. He thought that was just about half the distance between Albany and New York. He looked around for a possible landing place in case of difficulty during the flight, which was, I believe, for a purse of $25,000.

He saw a big field near Poughkeepsie, and said, "This would be a fine place for me to land in case I had to come down." He went up to the large building and said to the man who opened the door, "Can you tell me if I land here in an airplane it will be all right?"

The man said, "Come in! I want you to talk to the gentleman in charge." He went in to see the gentleman in charge. He said, "Would you mind, if my flight from Albany to New York is unsuccessful, if I land here?"

The gentleman in charge said, "You can land here if you want to; this is the insane asylum, and all of you land here eventually." (Laughter.)

There are four schools of thought on this very popular subject of stream-lining. Dr. Hunsaker has talked to you about airships and airplanes. We have all been down to the Automobile Show, and we have seen those beautiful stream-lined cars.

The first is the airplane school. The airplane school of stream-lining tries to keep things up in the air and reduce air resistance.

We have heard a great deal about stream-lining as adapted to other things. The astonishing thing to those of us who have been in aeronautics for ten to twenty years is that other engineers have only recently thought of adapting stream-lining to other forms of vehicles.

The second school of thought on stream-lining is the automobile and the railroad, which endeavors to keep things down and reduce air resistance. That is a different form of stream-lining than the airplane stream-lining. As you all know, the form of the cars used for the great speed races down at Daytona Beach are not the form of the airplanes or standard automobiles at all. They have great big fins, and they have big stabilizers to keep them down.

The third form of stream-lining, of course, is the steamship, which makes it easier to go through water.

The fourth, of course, does not concern us here, and is what I would call the Mae West form of stream-lining.

I have nothing to do with the Mae West form of stream-lining, the steamship form of stream-lining, or the railroad form of stream-lining, but so far as the airplane is concerned, I might take a minute or two to tell you what may happen in the future.

You have probably heard and read that the fastest airplane to-day flies at the rate of 423 miles per hour. That is the latest Italian record. The tests made by the National Advisory Committee for Aeronautics at Langley Field indicate that with a proper stream-lined form, and a new combination of wings and fuselage, that we can approximate speeds of 550 miles an hour with the present engines of 2,300 horse-power. When we get up to this speed, we are getting into what you may read in to-morrow morning's paper as "hard air"; that is, when you get up to that speed, you get a compressibility of air which we haven't experienced in airplane practice up to the present time.

This is not the prediction of Dr. Hunsaker or myself, but it is the prediction of the engineers who are working in the laboratories of the National Advisory Committee for Aeronautics.

If we can look ahead to what the laboratory experiments down at Langley Field indicate, we may get speeds of two hundred or three hundred miles per hour in commercial air transport in the near future.

You suggested that I discuss Dr. Hunsaker's remarks on airships, of which he is a proponent. In fact he is one of the best experts on airships in the United States. As I said before, I wouldn't attempt this, because I know he has a convincing answer to any questions I might ask.

President Perin: Would anybody like to ask the Doctor any questions? There is one question I would like to ask him: You stated data on the operation of Ford cars indicated that the running cost for the last two years, with the present low prices of gasoline, has been about 1.85 cents per mile for those Ford cars. In other words, if a man had a car, and was keeping it in the garage, the cost of gas, oil, tires and repairs totaled 1.85 cents. Our figures indicate that the total cost of operating a car, including depreciation and insurance, is just under four cents. My question is: Where did you get that one cent a mile figure?

Dr. Hunsaker: I got the four cents from the Goodyear Tire Company. I divided the four cents by four people and got one cent. We agree.

Mr. G. A. Orrok: I would like to ask Dr. Hunsaker if he has considered taxes in these figures?

Dr. Hunsaker: No.

Mr. Orrok: Taxes amount to eighteen cents per dollar of gross on a railroad, and about one-half a cent per dollar of gross on your bus. If you equalize the taxes, your bus and automobile, and all the other types of transportation would be much higher than the railroads.

Dr. Hunsaker: I said the picture had some unnatural features in it. What I was trying to bring out is, there seems to be a technological change going on, and the question is, what are we going to do about it? Is anyone going to have the opportunity to rebuild the railroads? There seems to be a chance.

Mr. Orrok: May I say one word more? Years ago, when we had a similar condition, we had in this city, cable railroads. These cable railroads cost something like forty-two cents per car mile to run, as I remember it. The problem was to get a system of transportation for New York City that wouldn't cost as much as forty-two cents per car mile. We couldn't use the overhead trolley, which averaged thirteen or fourteen cents per car mile. We had to go to an underground electric road, with two independent ground rails, and the slot which you are all familiar with. We cut the forty-odd cents of the cable road down to about twenty-two cents per car mile for the underground trolley, and we made a success of that system in this city.

PRESIDENT PERIN: I would like to ask Dr. Hunsaker a question in regard to the airship. When you get up to such large dimensions to be able to carry any tonnage, is there not a hazard due to the wind strains and the possibilities of deflection from your course due to this great resistance presented by the wind which people haven't taken into account? In other words, with this six- or seven-hundred-foot bag, are you going to be able to weather storms, and can it be so designed as to be, if in the field at all, a competitor of the heavier-than-air machine?

DR. HUNSAKER: I think the answer to that is somewhat in the realms of opinion. The hazard of a storm for all kinds of aircraft is there. It is all a question of allowing for it, estimating those hazards as well as we may. A good deal of progress has been made in the last fifteen years.

With regard to the airplane, I believe the hazard of ice and snow and rain and blind flying has been partially overcome, and completely overcome by canceling the flights when the weather is too bad. I think that the air lines make about ninety per cent. of their scheduled flights, and come in on time seventy-five per cent. of the time. The insurance rates for crash insurance are of the order of something less than eighteen or twenty per cent. per annum on the value of the airplane. For the airships, the insurance rate is not so great.

We have had the loss of the Akron in a storm, which appears, on investigation, not to have been due to the storm so much as to navigation. On the other hand, we have the Graf Zeppelin with her fifty crossings of the Atlantic, and an insurance rate of twelve per cent. per annum on her value.

The airship, due to her great size, must, I believe, always be in a somewhat uncomfortable position when she has to come down and be put in her shed. When she is in the air, her size is no handicap; she goes with the wind, because she is of the same density as air.

Of course, the future is the thing that answers all of these questions. It looks as if the airplane and the airship have all the elements of developing into practical vehicles whose degree of risk is comparable to that of other means of transportation. Neither of them have yet achieved the safety of the railroad and the steamship.

Mr. O. Singstad: I would like to ask Dr. Hunsaker a question. He must certainly have figured out, in order to show us the table that he did show, how the five or six per cent. of the people that cross the Atlantic and insist on depriving themselves of having five or six days of a pleasant journey, are going to cross in the future. We read about seadromes, we read about airplanes crossing the Atlantic without stopping, and we read about the Graf Zeppelin. I would like to know how these five or six per cent. are going to cross. Are they going to fly all the way by airplane without a stop? Are they going to go by lighter-than-air craft, or are they going to go by airplanes making stops at the seadromes?

Dr. Hunsaker: That question reminds me of the railroad passenger who said to the colored porter, "Mose, have you change for five dollars?"

The colored porter said, "No, sir, boss, but I thanks you for the compliment."

I can answer the question as of 1934, I think, with confidence, but I cannot predict what invention and discovery may do. At the present time, the airplane does not exist that can carry a pay-load, non-stop, across the Atlantic.

Your second question was: Shall we go by seadromes? I believe that the naval architects will tell you that seadromes can be built. The very doubtful thing is, whether anybody needs them. In view of the development of airships which don't need to stop, we might say that the seadromes are unnecessary, and it is inconceivable that there would be a sufficient traffic volume hopping over these stepping-stones to pay interest and depreciation on the cost of a string of these colossal vessels. I apologize for too long an answer to a simple question.

President Perin: The opera always had a ballet. Everybody knows and loves Mr. Louis Wiley. I wish Louis Wiley would divert us from this serious subject for a moment. (Applause.)

Mr. Louis Wiley: Mr. President and Gentlemen: I am in a new category, that of a divertissement or ballet. I heard some discussion of Mae West stream-line, but I have familiarity only with the head-line. I am beginning to feel that the advertisements have some merit.

I have never indulged in any flight, but I represent a calling which has representatives who have been known to have flights of the imagination.

I have no doubt that the future of the airplane will be as brilliant, and more so, as its glorious past. I feel that the airplane will be adapted to the delivery of newspapers, so that the residents of Chicago will be able to read *The Times* every morning at the breakfast table. (Applause.)

The story to which Dr. Perin alluded seemed to make a major impression on Mr. Minor. It was that of a banker in New York who was asked to entertain a visitor from the West. He took him to a number of speak-easies. He retired to his home at two o'clock in the morning. He explained to his wife that he had had a severe attack. She was sympathetic. "Attack of what?" she said.

Recalling the music at the Night Club, he responded "attack of syncopation."

The following morning she was frigid. She had searched the dictionary and found syncopation defined as an alternate movement from bar to bar. (Applause.)

Mr. Hunsaker said that a branch-line is unprofitable. I am a branch-line to-night. I am confident you will conclude I am stale and unprofitable.

The report of the tellers was highly illuminating. It was almost as satisfactory as the reports of some bank tellers during the last year or so.

I think one of the most hopeful indications of the progress we are making was made to-day in the message of the President to Congress. I think, as was indicated by the stock market quotations, we will go ahead to resume the prosperity that was halted in October, 1929. It must be realized that the President confronted a difficult task. Conditions were not of his making. He has tried by various experiments to surmount these difficulties. Perhaps he hasn't succeeded as some of us expected he would. He is inspired by the best of impulses, and wants to rescue the country from the condition in which it was placed.

Many people said that we would, by natural processes, have restored prosperity. They waited for four years during Mr. Hoover's administration. Finally, he was voted out, and President Roosevelt was put in his place, with instructions to do something.

President Roosevelt has embraced practically every suggestion that has been offered, showing he has an open mind. I am confident he has hit upon something that will produce good results. He has obtained hopeful results already.

A newspaper's duty is not to weld magnesium and aluminum, but to weld the people and weld the nations; and every self-respecting newspaper throughout the world is trying not to start war and trouble, but promote peace.

The airplane has a great future, and the press has a great future, just as it has had a noble past. The consulting engineers of the country have done a great constructive job. Let us hope they will be re-employed. (Applause.)

PRESIDENT PERIN: I propose we drink a toast to *The Times* and to its very able representative, Mr. Louis Wiley.

(The members arose and drank a toast to Mr. Louis Wiley.)

PRESIDENT PERIN: May they both be better!

MR. WILEY: Thank you very much.

PRESIDENT PERIN: After such an interesting talk as we have just had, it is rather hard on our Vice-President who is now to speak to us. Mr. Wendt and I are singing our swan songs. The swan was never noted for its sweetness of voice. Mr. Wendt is going to tell us what the situation has been in Washington recently, as far as he dares, because he lives there. Mr. Wendt, our Vice-President. (Applause.)

MR. EDWIN F. WENDT: Mr. President, Honored Guests, Fellow Members: I speak as the Chairman of the Committee on Legislation.

The committee desires to announce a note of optimism. Last year, I had the privilege of speaking for about five minutes, and in that time I announced a view which some of the members thought was very optimistic. I am here to-night to say that what I predicted a year ago was less than the facts as evidenced by the record of the past year.

The City of Pittsburgh, or the Pittsburgh area, is one of the best barometers of the business of the country. The University of Pittsburgh surveys the business of that region very week, and issues a report at least once a month, and the report for the last week of December, 1933, indicates that the improvement in production in the twelve months from December, 1932, to December, 1933, was thirty-three-and-one-third per cent.

The Bureau of Business Research of the University makes its calculations on the basis of production of iron and steel, coal, electric power, trade and railroad loadings.

The Vice-President of a manufacturing plant called at my office recently. I had been talking to him a year ago. He told me that his business increased eighty per cent. last year, and business in December was 350 per cent. better than it was the year before. He manufactures specialties which are patented.

I could give many other signs equally as encouraging. But I shall conclude this part of my remarks with the prediction that business in 1934 will exceed 1933 by at least fifteen per cent. To that extent, I am an optimist.

So far as the work of the Committee on Legislation is concerned, we have to report respecting a number of outstanding events, one of which was the legislation in connection with the Foreign Bondholders' Corporation. I shall say practically nothing about that, because Dr. Perin and Mr. Lavis are much better informed than I am. I only wish that Dr. Perin had told you gentlemen what he told me as his opinion of the outcome of that legislation. Suffice it to state that the Bondholders' Council has not yet had an opportunity to do more than organize.

The next important legislation for engineers was the Securities Act of 1933. Dr. Hunsaker speaks to us regarding the work of engineers and what is to be done in the way of development of airplanes, trucks and buses, automobiles, and railroads, but I can assure him that if an engineer should prepare a report to-morrow on any project that requires money to be raised by either stocks or bonds, and his report was filed with the Federal Trade Commission as a part of the registration statement, he would be subject to civil liability for ten years after the date of the preparation of the report; and any person who bought a share of stock or a bond in any company covered by that report, any purchaser who feels aggrieved, who thinks that the engineer made a mistake in the way of the omission of something that he thought was a fact, that is, that the purchaser thought was a fact, that purchaser, all the purchasers of the securities, be they one thousand or one hundred thousand, could sue the engineer at any time within a period of two years.

Gentlemen, the Securities Act of 1933 has been very disturbing to the consulting engineers. I interviewed one member of the Federal Trade Commission in regard to the matter, and handed him the most excellent report prepared by Mr. Burpee and Mr. Henry. I want to say to this body of engineers that the Commissioner welcomed the report, and said to me that nothing was more helpful than reports of engineers, accountants, and other professional men regarding this piece of legislation.

The report of the Burpee-Henry Committee has been circulated among our membership. If you haven't read it, please do so. It is the best report I have read on the Securities Act.

Careful consideration is being given to the question of how to change the Act and lighten the burden of the engineer. If any member of this body has a concrete suggestion as to the wording of an amendment, what clauses and sentences should be eliminated, I am quite certain that Secretary Henry would be glad to hear from you.

You all know, passing on to the next subject, that the Reconstruction Finance Corporation has loaned large sums of money mostly to banks and railroads. The Engineers' Advisory Board was disbanded last year. But the point I want to make is, that some of our members have been disturbed by reason of Government competition; that is, at the present time, the consulting engineer is really the unemployed man, and in many respects he is the forgotten man.

Since the Reconstruction Finance Corporation has made these large loans to railroads and banks, we may anticipate that that organization will do a great deal of engineering work in connection with the reorganization of railroads, just as it has already done in connection with the Frisco.

The next important piece of legislation last year was the amendment of the Bankruptcy Act. This is really an epochal piece of legislation. Hereafter, the Interstate Commerce Commission will have a great deal to do with the reorganization of railroads, and the plans of refinancing. That Act, for the first time, puts into the hands of the Interstate Commerce Commission the power not only to control the appointment of trustees, but the power to determine the maximum salaries for lawyers and engineers and other experts in connection with all the work incident to reorganization. It also puts into their hands great discretion in connection with the details of the plans which are prepared by security holders. There again, the consulting engineers may anticipate that the Commission, through its own forces, will do a great deal of work which heretofore has been done by consulting engineers. I could talk a long time on this Bankruptcy Act, but I will pass on.

Another piece of legislation of the year was what is known as the NRA. Those three letters are now household letters, and everybody understands their meaning. However, a number of codes have been presented covering engineers. Mr. Henry was in Washington some time ago, on the day when the hearing was in progress concerning inspecting engineers. Professor Jackson, of M. I. T., was very much interested in this, as well as other men both in colleges and outside. We presented on behalf of our organization the best statement we could make respecting that code, and I am glad to state we are informed that it will be combined with the Professional Engineers' Code.

Another code which was considered was the Real Estate Appraisers' Code. I appeared at the hearing last week and advocated that professional engineers be excluded from its operations, because there was a code for professional engineers, and it is inequitable to require engineers to become subject to several codes. The proponents of that code assured me that they had no intention of covering railroads, public utilities, or large manufacturing plants, yet the way the code is drawn would include the work of the members of this organization. I am hoping if there is any code at all covering appraisers, that it will be the Professional Engineers' Code.

You understand, I think, from having read the technical journals in the last few days that the Construction Code, which has been hanging fire for a long time, has been completed and is now on the President's desk.

The Construction Code will mark an epoch in the history of the construction industry of our country.

Then, we have in Washington what is called the Public Works Administration. A number of our distinguished members, Mr. Eddy, Mr. Henry, Mr. Emerson, Mr. Pirnie and others are members of the Technical Board of Review. I shall only say that here is one place where the consulting engineer has been recognized. All of the members of the Technical Board of Review are consulting engineers of high standing in different parts of the country. We can score one, I think, for our profession in that respect.

I come now to what is called the CWA. That is the organization which provides for the unemployed. However, it hasn't done anything for the unemployed consulting engineers. It has, in fact, taken work away from the consulting engineers. Some of our members have written letters to Mr. Henry, and called attention to the fact that where they had been doing consulting work, the CWA had taken the work from them.

This matter of Government competition with the consulting engineers is serious. But under the conditions which now prevail throughout the United States, little can be done, because relief must be provided, and Congress always makes it difficult for every Government department to pay consulting engineers even half the established fees; and in many instances, Congress makes it impossible to even employ consulting engineers where they are needed.

There has been a great deal of complaint respecting the fact that engineers are working in the CWA and they are receiving less money than the skilled mechanics.

Another point I wish to make is, that there is in Washington a Conference on Appraisal Practices. It was called informally by the Chamber of Commerce of the United States. Mr. Hammond, the President of the American Society, has been at one or two of the meetings. I have attended the meetings. The Conference is informal. It is a Conference on Appraisal Practices, and what gives rise to the Conference, at least one thing is the fact that the Government is now loaning large sums of money on properties, farms in particular, all over the United States. It was soon found that the practices of engineers and other experts varied greatly. Some gentlemen thought that there might be some progress made, and some uniformity gotten by having a conference of experts.

My next point is that Congress authorized an organization known as the Federal Co-ordinator of Transportation. When the organization was effected, Mr. Eastman selected one of our distinguished members, who is present this evening, as his Chief Engineer in connection with research work. He has conducted the widest possible investigation in regard to transportation. When the results are announced, I believe we will all find that we are going to get some data from the work of the Federal Co-ordinator of Transportation that we have never had before. I feel that we are going to get some valuable data, including reliable information on trucks, buses, and highway transportation.

You have all heard a great deal about what is called the Prince Plan of Consolidation of Railroads. I shall say nothing about that Plan, except to make one remark,—the whole Plan is being investigated by the Federal Co-ordinator's engineering organization.

Let me state just one fundamental defect, in my opinion, of what is called the Prince Plan of Consolidation. It fails to consider the social requirements of the people. The Prince Plan proposes to blot out millions of dollars' worth of railroad property. Thousands of our people have their residences along the main lines which the Prince Plan proposes to abandon. Also, there are hundreds of manufacturing plants in operation along these lines.

I think it may well be said that the Prince Plan fails to consider the social well-being of a large part of our population.

Finally, I call your attention to the fact that the Council, that is, the American Institute of Consulting Engineers, has co-operated with American Engineering Council during the past year, as well as previous years. There has been a large amount of legislation considered, one point being the competition of the Government with the work of consulting and other engineers.

I shall say nothing further regarding the Council except this: The President of the American Engineering Council sits at this table, Mr. John F. Coleman. I am confident that during the course of his administration he will be prepared to make important announcements to this as well as other member organizations. (Applause.)

PRESIDENT PERIN: The meeting is adjourned.

(The meeting adjourned at eleven o'clock.)